MOBILE MEDICAL APPARATUS

The present invention relates to mobile medical apparatus, in particular surgical tables.

Surgical tables comprising a base for standing on the floor, a column of adjustable height mounted on the base and a tabletop providing a patient support surface are well known. The table usually has some mechanism for adjusting the angle of the top, which is commonly divided into several separate sections, the angle of which relative to one another can be varied.

Surgical tables need to be movable over a floor and to this end known tables have wheels or castors to enable them to be moved. It is necessary for the wheels and castors to bear the weight of the table, which may also require the weight of heavy patients to be carried, while still providing stability during surgical procedures. It is also necessary for the tables to have feet which enable the tables to be secured in position by engagement of the feet with the floor.

Various mechanisms are known to enable the feet on the one hand and the wheels or castors on the other hand to be selectively engaged to be in contact with the floor, to enable the pedal selectively to be put in a fixed position or a movable position. It is also known to provide foot-operated pedals on the table to permit the selection of the required position. Known pedal arrangements suffer from a number of problems.

First, some known pedal arrangements are only acceptable by an operator from one side of the table, in some arrangements at one or both ends of the table. This can limit the usability of the table by medical staff, by restricting access to the pedal, for example when that side of the table from which the pedal can be accessed is restricted by medical equipment connected to the patient. Also, some known pedal arrangements require a twisting action of the foot in order to move the pedal between locked and unlocked positions. Furthermore, some known pedal arrangements require the pedal to be pulled upwardly by the foot of an

operator and again this can cause operator injury, or is sometimes difficult to implement in practice. In addition, some tables require the pedal arrangement to cause lifting of the entire weight of the table, together with the weight of the patient, when the table is moved between the fixed and movable positions. The pedal arrangement therefore requires a high mechanical advantage to enable the operator to lift the weight of the table and the patient by operation of the pedal without having to exert high forces on the pedal, which otherwise could cause operator injury, particularly if pedal access is restricted or a twisting or upward pulling action is required.

It is an aim of the present invention at least partially to overcome one or more of these problems of known surgical tables.

Other mobile medical apparatus is known which includes wheels and/or castors and feet and/or brakes where it is necessary selectively to brake or unbrake the apparatus, for example by operating a pedal. Such apparatus includes patient beds, operating table transfer systems, etc. There is a need for an improved mechanism for selecting a braking mechanism of such an apparatus.

The present invention provides a mobile medical apparatus comprising a moving mechanism for moving the apparatus across a surface on which the apparatus can stand and a securing mechanism for securing the apparatus in a position on the surface, and an actuator operated mechanism for selective engagement of the moving mechanism or the securing mechanism, an actuator of the actuator operated mechanism being movable in a first downwards motion from an unlocked position, at which one of the moving mechanism or the securing mechanism is engaged, to a locked position, at which the other of the table moving mechanism or the table securing mechanism is engaged, and then further downwardly in a second downwards motion to unlock the actuator mechanism and permit the actuator to return to the unlocked position.

The present invention also provides a surgical table comprising a base for standing on a floor, a column of adjustable height mounted on the base and a tabletop providing a longitudinal patient support surface, the base having first and second longitudinally opposed ends, at least one end of the base being provided with a table moving mechanism for moving the table across a floor and a table securing mechanism for securing the table in a position on the floor, and a pedal operated mechanism for selective engagement of the table moving mechanism or the table securing mechanism with the floor, a pedal of the pedal operated mechanism being rotatable about a single axis.

The preferred embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Figure 1 is a schematic side view of a surgical table in accordance with an embodiment of the present invention;

Figure 2 is a schematic exploded perspective view of part of the surgical table of Figure 1 showing the wheel and castor arrangement and the pedal arrangement on the chassis;

Figure 3 is a schematic perspective view of one end of the chassis of Figure 2 in a pedal up/table locked position;

Figure 4 is a schematic perspective view of the end of the table shown in Figure 3 in a pedal down/table unlocked position;

Figure 5 is a schematic perspective view of the end of the table of Figure 3 showing the position of the pedal and the table when proceeding from the unlocked position to the locked position by releasing the pedal from the pedal down position; and

Figures 6(a), (b), (c), (d) and (e) show the relationship between the catch arm and the catch pawl of the pedal locking mechanism of Figures 3 to 5 in sequential positions as a result of operation of the pedal.

Referring to Figure 1, the surgical table, designated generally as 2, includes a base 4, which stands on the floor 6, a column 8 of adjustable height mounted on the base 4 and a tabletop 10 providing a patient support surface 12.

The tabletop 10 is divided into four sections, namely a head section 14, an upper torso section 16, a lower torso section 18 and a leg section 20. The head and leg sections 14,20 each have a respective separate mattress 22,24. The upper and lower torso sections 16,18 have a common mattress 26 extending along the length of both sections 16,18. The common mattress 26 is provided with a pair of spaced parallel grooves 28,30 extending transversely across the width of the tabletop 10 above the location of a first pivot joint 32 between the upper and lower torso sections 16,18. This permits flexing of the common mattress 26 when the upper and lower torso sections 16,18 are relatively inclined to each other by pivoting about a transverse axis defined by the pivot joint 32, as will be described in detail hereinafter.

A lower end 34 of the head section 14 is mounted on an upper end 36 of the upper torso section 16 by means of a second pivot joint 38 defining a transverse axis about which the head section 14 can be displaced relative to the upper torso section 16. The angle of inclination of the head section 14 is controlled by means of a pair of conventional adjustable struts 40, only one of which is shown in Figure 1, secured to and extending between the underside of the head section 14 and the upper torso section 16, one on each side of the tabletop 10. The struts 40 may be hydraulic or electric actuators or lockable gas springs. The leg section 20 is similarly mounted at a lower end 42 of the lower torso section 18 for displacement about a transverse axis defined by a third pivot joint 44 by means of two struts 46, only one of which is shown, secured at opposite ends thereof to the lower torso section 18 and the leg section 20.

The provision of the three pivot joints 32,38,44 permits the four sections 14,16,18,20 selectively to be inclined relative to adjacent sections 14,16,18,20 thereby to dispose the tabletop 10 in a selected configuration.

The present invention concerns the structure and operation of castors and wheels and associated locking devices on the base 4 of the surgical table 2, and in particular to a pedal arrangement for permitting an operator selectively to configure the table in a locked configuration, when the table is fixed in position on the floor for example to enable a surgical operation to be performed on the patient lying on the table, or in an unlocked configuration, when the table can be moved across the floor for example to enable the patient to be moved in to or out of an operating theatre.

Referring to Figure 2, a chassis 50 of the base 4 has mounted thereon at one, front, longitudinal end 51, in the direction of the leg section 20, a pair of front fixed wheels 52,54, each of which wheels 52,54 is mounted about a respective fixed axis 56,58 at a respective longitudinal edge part 60,62 of the chassis 50. The front fixed wheels 52,54 are provided to assist in achieving straight-line movement of the surgical table 2 when it is pushed from the other, rear end. At the other, rear, longitudinal end 64 of the chassis 50 is provided, on opposed longitudinal sides 66,68 of the chassis 50, a pair of swivel castor wheels 70,72. The swivel castor wheels 70,72 are provided at the rear of the surgical table 2 so as to assist positioning of the surgical table 2 in the desired location, and to assist in the surgical table 2 being pushed from a rearwardly direction other than in a straight line movement.

The surgical table 2 is additionally provided with further castors and locking mechanisms not only to lock the table 2 securely in position when used during surgery, but also to enable the position of the table 2 finely to be adjusted at the desired position.

At the rear end of the table 2, inwardly located in longitudinal direction relative to a pair of fixed feet 100,102 in the form of pads, are located the pair of rear castors

70,72. Each of the rear castors 70,72 is mounted on and depends downwardly from a horizontal plate member 104 extending transversely across the width of the chassis 50. The plate member 104 has holes 106,108 therein though which extend upwardly directed guide pins 110,112, each guide pin 110,112 being located on a respective side of a central longitudinal axis of the surgical table 2. The plate member 104 can move upwardly and downwardly relative to the guide pins 110,112. The castors 70,72 rest on the floor when the table is braked and provides an antistatic pathway to the floor. In this configuration, the rear of the table 2 rests on the floor 6 by the fixed feet 100,102 so that the table 2 is securely positioned on the floor 6. This arrangement provides the advantage that the table height is at its lowest when the table is secured in position, for example during a surgical procedure. This makes the table much easier to use than other tables, because the minimum table height can be provided during surgical use.

When it is necessary to move the surgical table 2, the rear castors 70,72 are lowered by a rear castor lowering mechanism, designated generally as 116, which is arranged to apply a downwardly directed force onto the top surface of the plate member 104.

The rear castor lowering mechanism 116 acts to raise the rear end 64 of the table 2, so as lift the feet 100,102 off the floor 6.

The rear castor lowering mechanism 116 is shown in greater detail in Figures 3 to 5 and comprises a horizontally oriented shaft 120 which is rotatably mounted at one end thereof in an upwardly extended pedal support member 122 connected to the upper surface of the chassis 50. The other end of the shaft 120 is rotatably mounted in an inward support member 124 extending upwardly from the upper surface of the chassis 50.

The support members 122,124 are located on opposed sides of the plate member 104 and above the plate member 104. A roller bearing 126 is eccentrically mounted relative to the axis of the shaft 120, the roller bearing 126 having an axis parallel to that of the shaft 120. The roller bearing 126 is free to rotate but

translationally rigidly attached to the shaft 120 by a pair of opposed arms 128,130) located at opposed ends of the roller bearing 126.

The shaft 120 has mounted thereon a first helical gear 132 having an external helically threaded surface 134. The first helical gear 132 is located between the pedal support member 122 and the arm 130. The first helical gear 132 is securely fixed to the shaft 120 so as to prevent any relative rotational movement therebetween. Consequently, any rotation of the first helical gear 132 causes corresponding rotation of the shaft 120 and vice versa. The external helical thread 134 of the helical gear 132 meshes with the external helical thread 137 (see Figure 2) of a second helical gear 138 having an axis of rotation orthogonal to that of the helical gear 132. The second helical gear 138 is fixed, so as to prevent relative rotational movement therebetween, to a pedal-bearing shaft 140 rotatably mounted in the pedal support member 122. A pair of pedal support arms 142,144 are mounted to the pedal-bearing shaft 140, with each arm 142,144 fixed to a respective end of the shaft 140. A pedal 146, having an upward foot engaging surface 148, is mounted to the other ends of the arms 142,144. The pedal 146 extends in a transverse direction across the width of the table 2. Each arm 142,144 extends through a hole in a pedal splash guard 143,145 which is free to move within the cover housing 147 (see Figure 1) so it slides with the pedal arms 142,144 while covering corresponding slots in the cover housing 147.

A catch operated pedal locking mechanism, designated generally as 150, is located at the end of the shaft 120 remote from the first helical gear 132. The arm 128 extends radially away from the axis of the shaft 120 and has a free end thereof constituting a catch member 152. The catch member 152 is defined between two mutually inclined surfaces comprising an upper surface 154 and a lower surface 156, between which there is located a notch 158 at a pointed end 164 of the catch member 152. Rotation of the shaft 120 causes corresponding rotation, about the same axis, of the catch member 152.

A catch pawl 160, is rotatably mounted on a pawl support member 162 which is affixed to the upper surface of the chassis 50. As shown in greater detail in Figure

6(a), the catch pawl 160 includes a pointed end 163 defined by upper and lower inclined surfaces 166, 168. The catch pawl 160 is pivotally mounted about a pivot 169 to the pawl support member 162 so that the catch pawl 160 may be rotated about a rotational axis 170. A helical tension spring 172 is mounted between respective mounts 174,176 on the pawl support 162 and catch pawl 160 respectively. The spring 172 biases the catch pawl 160 into an upwardly oriented position, as shown in Figure 6(a). The pointed free end 163 of the catch pawl 160 is shaped and configured to engage the notch 158 in the catch member 152.

A respective stop member 180,182 is mounted on and depends downwardly from a respective end 184,186 of the plate member 104. Each stop member 180,182 includes a lower end 188,190 thereon whose vertical position can be adjusted. The vertical distance between the lower surface 192 of the ends 184,186 of the plate member 104 and the respective lower end 188,190 defines the minimum height between the respective end 184,186 of the plate member 104 and the upper surface 194 of the chassis 50 (see Figure 3).

The operation of the rear castor lowering mechanism 116 will now be described with reference to Figures 3 to 6.

In the table locked position in which the feet 100,102 rest securely on the floor, the pedal 146 is in an upward position and the castors 70,72 rest on the floor. As shown in Figure 6(a), the catch member 152 is in a rotatable position such that the pointed end 164 of the catch member 152 is located generally above the catch pawl 160, and vertically separated therefrom. The end 163 of the catch pawl 160 is maintained in an upwardly inclined orientation as a result of the bias supplied by the tension spring 172.

When it is desired to move the table 2, a user pushes downwardly on the upper surface 148 of the pedal 146 with his foot. This simply downward motion causes rotation of the pedal support shaft 140 about an axis transverse to the table 2, in turn causing rotation of the second helical gear 138 and, consequently, the first helical gear 132, meshed therewith. This in turn causes rotation of the shaft 120,

which causes the roller bearing 126 and the catch member 152 to be rotated downwardly. The roller bearing 126 already in contact with the plate member 104 pushes the plate member 104 downwardly and consequently lowers the castors 70,72 toward the floor. As shown in Figure 6(b), continued rotation of the shaft 120 as a result of continued downward movement of the pedal 146 causes the lower surface 156 of the catch member 152 to engage the upper inclined surface 166 of the catch pawl 160. Thus rotation of the catch member in the direction A shown in Figure 6(b), causes rotation, in the opposition rotational direction, of the catch pawl 160 in the direction of arrow B shown in Figure 6(b). The rotation of the catch pawl 160 is against the bias of the helical spring 172.

Further continued rotation of the shaft 120 causes the catch member 152 to rotate to a position as shown in Figure 6(c), where the notch 158 is disposed adjacent the end 163 of the catch pawl 160 and, under the action of the bias of the helical spring, the end of the catch pawl 160 is received in the notch 158. This locks the catch mechanism and defines a locked position for the pedal 146. The resultant configuration is also shown in Figure 4.

In this position, the lower ends 188,190 of the stop members 180,182 bear against the upper surface 194 of the chassis 50, thereby defining additionally a limit of downward movement of the castors 70,72, and also defining a limit of free downward movement of the plate member 104, which in turn defines a limit of free rotation of the catch member 152. This assists in assuring that the end 163 of the catch pawl 160 is reliably received in the notch 158 and that an operator does not inadvertently depress the pedal 146 so much or so quickly that the catch pawl 160 and the catch member 152 are not locked together.

In this configuration, the pedal is in a downwards position and is locked therein as a result of the securing of the end 163 of the catch pawl 160 in the notch 158, which prevents further rotational movement in either direction of the shaft 120 (locked in one direction by the catch and in the other by the stop screws 180,182) absent any further downward movement of the pedal 146. In this position, the castors 70,72 have been lowered further so as to have raised the feet 100,102 off

from the floor, so that the weight of the end of the table 2 is borne by the castors 70,72. The table 2 is now ready to be moved.

An operator using the table 2 can readily determine when the table unlocked position has been reached because as the end 163 of the catch pawl 160 is urged into the notch 158 of the catch member 152 under the bias of the helical spring 172, an audible click can be heard. When this occurs, the operator knows that the castors 70,72 have been locked in a down orientation (or the feet 100,102 locked in an up position) and the table is ready to be moved.

When an operator wishes to put the table back into a locked position, the pedal is simply pushed further downwardly from the pedal down position, as shown in Figure 5. Since the plate member 104 as a whole cannot move downwardly any further as a result of the engaging of the stop members 180,182 with the upper surface 194 of the chassis 50, any further downward pressure on the pedal 146 encounters resistance to movement since further movement can only be achieved by physical flexing of the plate member 104 between the two stop members 180,182 as a result of a central downwards force applied by the roller bearing 126. In this way, the plate member 104 acts a leaf spring so as to permit further downward movement of the pedal 146, but only by application of an increased downwards force.

As shown in Figure 6(d), further downward movement of the pedal 146 causes the catch member 152 to be further rotated in the direction of the arrow C shown in Figure 6(d) thereby to release the catch pawl 160 from the notch 158 of the catch member 152 and dispose the catch pawl 160 adjacent to the upper surface 154 of the catch member 152. Accordingly, the catch pawl 160 is then free to rotate in an opposite rotational direction shown by arrow D past the upper surface 154 of the catch member 152 under action of the bias from the helical spring 172. Thus further downward pressure on the pedal 146 causes disengagement and unlocking of the catch mechanism.

When foot pressure is thereafter removed from the pedal 146, the weight of the rear end of the table 2 causes the feet 100,102 to be lowered towards the floor 6 thereby pushing the castors 70,72 and the plate member 104 upwardly. A damper mechanism 114, which may be hydraulic or pneumatic, damps this movement. This in turn causes rotation in an opposite direction of the catch member 152 in the direction of the arrow E shown in Figure 6(e) so that the catch member 152 is returned to the original position shown in Figure 6(a). The catch member 152, when rotated back to this position, slides and pushes against the lower inclined surface 168 of the catch pawl 160, thereby causing the catch pawl 160 to rotate in an opposite rotation direction about the arrow F shown in Figure 6(e). After the free pointed end 164 of the catch member 152 has slid past and been released from the catch pawl 160, the catch pawl 160 is urged back to the original upwardly oriented position shown in Figure 6(a) under the bias of the helical spring 172.

At the front end 51 of the table 2, inwardly located in a longitudinal direction relative to the front fixed wheels 52,54, are provided a pair of front castors 78,80. Each of the front castors 78,80 is mounted on and depends downwardly from a horizontal plate member 82, extending transversely across the width of the chassis 50. The plate member 82 has holes 84,86 therein though which extend upwardly directed guide pins 88,90, each guide pin 88,90 being located on a respective side of a central longitudinal axis of the surgical table 2. The plate member 82 can move upwardly and downwardly relative to the guide pins 88,90. The plate member 82 is ordinarily disposed so that the front castors 78,80 rest on the floor 6.

When it is necessary finely to position the surgical table 2, the front castors 78,80 are lowered by a front castor lowering mechanism, designated generally as 92, which is arranged to apply a downwardly directed force onto the top surface 96 of the plate member 82. The lowering mechanism 92 acts to raise the front end 51 of the table 2, so as lift the front fixed wheels 52, 54 off the floor 6 by pushing down the front castors 78,80 towards the floor thereby to bear the load of the front

end 51 of the table 2 to enable to table 2 to be more readily positioned or finely moved.

The front castor lowering mechanism 92 has a structure and operation similar to those of the rear castor lowering mechanism 116, except that instead of stop members and the flexing of the plate member being employed to define the pedal locked position and enable the plate member to be lowered further by application of an increased force, disc springs or Belleville washers are provided between the plate member and the chassis to achieve a similar operation and function.

The front castor lowering mechanism 92 comprises a horizontally oriented shaft 220 which is rotatably mounted at one end thereof in an upwardly extended pedal support member 222 connected to the upper surface of the chassis 50. The other end of the shaft 220 is rotatably mounted in an inward support member 224 extending upwardly from the upper surface of the chassis 50.

The support members 222,224 are located on opposed sides of the plate member 82 and above the plate member 82. A roller bearing 226 is eccentrically mounted relative to the axis of the shaft 220, the roller bearing 226 having an axis parallel to that of the shaft 220. The roller bearing 226 is free to rotate but translationally rigidly attached to the shaft 220 by a pair of opposed arms 228,230 located at opposed ends of the roller bearing 226.

The shaft 220 has mounted thereon a first helical gear 232 having an external helically threaded surface 234. The first helical gear 232 is located between the pedal support member 222 and a spacer 229 which in turn is adjacent to the arm 228. The first helical gear 232 is securely fixed to the shaft 220 so as to prevent any relative rotational movement therebetween. Consequently, any rotation of the first helical gear 232 causes corresponding rotation of the shaft 220 and vice versa. The external helical thread 234 of the helical gear 232 meshes with the external helical thread 236 of a second helical gear 238 having an axis of rotation orthogonal to that of the helical gear 232. The second helical gear 238 is fixed, so as to prevent relative rotational movement therebetween, to a pedal-bearing shaft

240 rotatably mounted in the pedal support member 222. A pair of pedal support arms 242,244 are mounted to the pedal support shaft 240, with each arm 242,244 fixed to a respective end of the shaft 240. A pedal 246, having an upward foot engaging surface 248, is mounted to the other ends of the arms 242,244. The pedal 246 extends in a transverse direction across the width of the table 2. Each arm 242 ,244 extends through a hole in a pedal splash guard 243, 245 which is free to move within the cover housing 147 (see Figure 1) so it slides with the pedal arms 242,244 while covering corresponding slots in the cover housing 147.

A catch-operated pedal locking mechanism, designated generally as 250, is located about half way along the shaft 220 from the first helical gear 232. The arm 228 extends radially away from the axis of the shaft 220 and has a free end thereof constituting a catch member 252. The catch member 252 is defined between two mutually inclined surfaces comprising an upper surface 254 and a lower surface 256, between which there is located a notch 258 at a pointed end 264 of the catch member 252. Rotation of the shaft 220 causes corresponding rotation, about the same axis, of the catch member 252.

A catch pawl 260, is rotatably mounted on a pawl support member 262 which is affixed to the upper surface of the chassis 50. Similar to the catch pawl 160, the catch pawl 260 includes a pointed end defined by upper and lower inclined surfaces. The catch pawl 260 is pivotally mounted about a pivot to the pawl support member 262 so that the catch pawl 260 may be rotated about a rotational axis. A helical tension spring is mounted between respective mounts on the pawl support 262 and catch pawl 260 respectively. The spring biases the catch pawl 260 into an upwardly oriented position, similar to that shown in Figure 6(a) for catch pawl 160. The pointed free end of the catch pawl 260 is shaped and configured to engage the notch 258 in the catch member 252.

The operation of the front castor lowering mechanism 92 is similar to that of the rear castor lowering mechanism 116. At least when proceeding from the pedal up/front castors disengaged position to the pedal down/front castors engaged position, the catch member and the catch pawl operate in a manner similar to that

shown in Figure 6(a) to 6(c). When proceeding from the pedal down/front castors engaged position back again to the pedal up/front castors disengaged position in a manner that is similar to Figures 6(d) and 6(e) for the rear castor lowering mechanism, although the movement and operation of pedal is the same for the front castor lowering mechanism, the manner in which the resistance against further movement of the plate member 82 is achieved is different. The lowering of the table onto the fixed front wheels 52,54 is damped by a hydraulic or pneumatic damper mechanism 91.

In the front castor lowering mechanism 92, rather than stop members, a pair of disc springs or Belleville washers 280,282 is provided around each guide pin 88,90 between the upper surface 194 of the chassis 50 and the lower surface of the plate member 82. For each pair of disc springs 280.282, the two larger diameter conical edges are in contact and spacers 281,283 are provided above and below the pair of disc springs 280,282. The height of the spacers 281,283 is selected so that in the pedal down position, corresponding to that, for the rear castor lowering mechanism shown in Figure 6(c), the disc springs 280,282 provide resistance against any further downward movement of the plate member 82 towards the upper surface 194 of the chassis 50. In moving from the pedal down position, as similarly represented by Figure 6(d) for the rear castor lowering mechanism, in order to disengage a catch pawl 260 from the notch 258 in the catch member 252, this is achieved by further downwards movement of the pedal 246 but this requires an increased force as a result of the need to compress the two pairs of disc springs 280,282 which provide a biasing force resisting such movement. Thus in this embodiment, the disc springs 280,282, rather than flexing of the plate member 82, provides an additional spring force resisting further movement of the plate member 82 from a pedal down position, but permitting such further movement on the application of increased pedal force. As for the rear castor lowering mechanism, when the pedal 246 of the front castor lowering mechanism is depressed sufficiently so as to disengage the catch pawl 260 from the catch member 252, release of foot pressure from the pedal 246 can permit the pedal 246 to move upwardly, and the catch pawl 260 and the catch member 252

to move in a manner similar to that shown, for the rear of the castor lowering mechanism, in Figures 6(d) and 6(e).

For the front castor lowering mechanism, in order to make the front castors 78,80 take the load off the table with a patient thereon instead of the front fixed wheels 52,54, it is necessary to lift the entire front end of the surgical table, comprising a proportion of the weight of the table and the weight of any patient lying on the table.

For each of the front and rear castor lowering mechanisms, the use of a pedal which can be rotated about an axis extending transversely across the width of the respective end of the table provides the advantage that a pedal mechanism can be provided which can readily be accessed by an operator from both sides of the table. Furthermore, since the pedal is rotatable about such a single transverse axis, and can be moved from an unlocked position, to a locked position, and then back to the unlocked position simply by downward pressure on the pedal by the foot of an operator, this provides a very simple and efficient operating mechanism which does not require any twisting of the foot of the operator or any pulling upwards force of the foot of the operator to lift the pedal. In addition, the use of a pair of helical gears having orthogonal axes for operating the roller bearing to push downwardly on the plate member, in conjunction with the eccentric mounting of the roller bearing, provides a high degree of mechanical advantage when the foot pedal is operated by foot pressure. This enables an operator to operate the pedal to lift the weight of the table, which can be significant particularly when loaded with a heavy patient, while minimising the risk of injuries to the operator. Also, the gas-damped spring provides damping when lowering the table again thus avoiding excessive shock transfer to any patient on the table.

The pedals are selectively movable so that when the front pedal is up and the rear pedal is down the table is configured to be movable in a straight line, when both the front and rear pedals are down the table is configured to be movable in any direction on the front and rear castors, and when both pedals are up the table is braked.

This preferred embodiment of the present invention accordingly provides a simply pedal locking mechanism that can easily be operated by a user using one foot, particularly whilst wearing lightweight footwear typically used in operating theatres and hospitals.

Although the illustrated embodiment of the invention concerns a surgical table, the invention is applicable generally to mobile medical apparatus, for example patient beds, patient chairs, operating table transfer systems, and supports or stands for other medical apparatus. Such apparatus is not required to stand on a floor, but could stand on another surface such as a tabletop or work bench top. Furthermore, the mobile medical apparatus may have a plurality of different base parts, and the moving and/or securing mechanisms may be provided on any or all of the base parts, in any combination.

Furthermore, although the preferred embodiments employ a pedal as the actuator for selecting between the braking or un-braking of the mobile medical apparatus, the pedal being foot operated, in alternative embodiments the actuator could be hand operated, for example a manually operated handle, or could be operated by a separate operating mechanism, which may be mechanically or electrically operated.

Furthermore, although the illustrated embodiment employs a pedal having a single part defining a single upper surface which is engaged by an operator, the pedal could instead comprise multiple parts, with one part being operated to lock the pedal and another part being employed to unlock the pedal. For example, when two pedal parts are provided, one or both of the pedal parts should be pushed down to lock the pedal and then only one pedal part needs to be pushed down further so as to unlock the entire pedal. The second pedal part could comprise a flange adjacent to the first pedal part. Furthermore, a single actuator operating mechanism may be provided having two operable actuator parts, one operating to engage a brake of the mobile medical apparatus, and another being employed to disengage the brake of a mobile medical apparatus.

In addition, although in the illustrated embodiment two pedal mechanisms are provided, one on each end of the base of the surgical table, in the mobile medical apparatus of the present invention, only one actuator operating mechanism may be provided, and a single actuator operating mechanism can be provided on a side or end of the apparatus. When the apparatus is a surgical table, an actuator mechanism could be provided on either side and/or either end of the surgical table. When a plurality of actuator operating mechanisms are provided, they could be linked together by a linking mechanism, so that operation of a linking mechanism simultaneously operates the plurality of actuator mechanisms.